Service Manual

ViewSonic E55-2
Model No. VCDTS21914-2

15" Digital Controlled Color Monitor



(E55-2_SM_566 - Rev. 1a – May 2002)

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Revision History

Revision	Date	Description Of Changes	Approval
1a	7/15/02	Initial Release DCN-2342	K.Yang

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1. PRECAUTIONS AND NOTICES

WARNING !

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warning or caution to advise non-technical individuals of potential dangers in attempting to service a product. Product powered by electrical should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the products dealt within this service information by anyone lese could result in serious Injury or death.

1. CAUTION.
   No modification of any circuit should be attempted. Service work should only be performed after you are thoroughly familiar with all of the following safety checks and servicing guide lines.
2. SAFETY CHECK.
   Care should be taken while servicing this CRT display because of the high voltage used in the defection circuits. These voltages are exposed in such areas as the associated flyback and yoke circuits.
3. FIRE & SHOCK HAZARD.
   Insert an isolation transformer between the CRT display and AC power line before servicing the chassis. In servicing, pay attention to original lead dress especially in the high voltage circuit. If a short circuit is found, replace all parts which have been overheated as a result of the short circuit.
   All the protective devices must be reinstalled per original design.
   Soldering must be inspected for possible cold solder joints, frayed leads, damage insulation, solder splashes or sharp solder points. Be certain to remove all foreign material.
4. LEAKAGE CURRENT COLD CHECK.
   Unplug the AC cord and connect a jumper between the prongs on the plug.
   Turn the CRT display power switch "on"
   Measurement the resistance value with an ohmmeter between the jumpered AC plug and each exposed metallic part on the CRT display such as the metal frame, screwheads, control shafts, etc. When the exposed metallic part has a return path to the chassis, the reading should be 1.8 MegaOhm minimum.
5. LEAKAGE CURRENT HOT CHECK.
   Plug the AC cord directly into the AC outlet. Do not use and isolate transformer during this check.
   Connect a 1500ohm, 10 watt resistor, paralleled by a 0.15uF capacitor between each exposed metallic part and a good earth ground (as shown in Fig.1)
   Use an AC voltmeter with 1000ohm/volt or more sensitivity and measure the AC voltage across the combination 1500ohm resistor and 0.15uF capacitor.
   5-1 Move the resistor connection to each exposed metallic part and measure the voltage.
   5-2 Reverse the polarity of the AC plug in the AC outlet and repeat the above measurement.
   5-3 Voltage measured must not exceed 7.5 volt RMS, from any exposed metallic part to ground A leakage current tester may be used the above hot check, in which case any current measured

must not exceed 5.0 milliamp. In the case of a measurement exceeding the 5.0 milliamp value, a rework is required to eliminate the chance of shock hazard.

Note: High voltage is present when this CRT display is operating. Always discharge the anode of the picture tube to the display chassis.

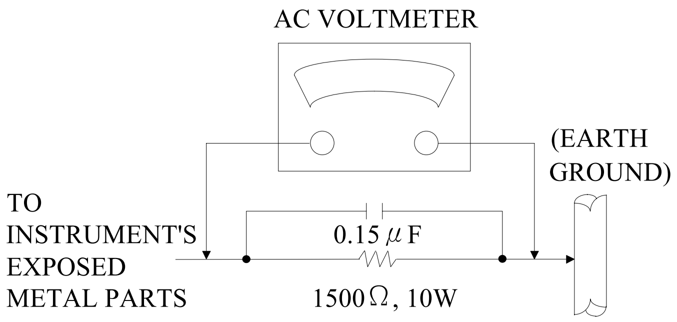


Fig. 1

6. IMPLOSION PROTECTION.

Picture tubes are equipped with an integral implosion protection system, but care should be taken to avoid damage and scratching during installation.

7. X-RADIATION.

WARNING: The only potential source of X-Radiation is the picture tube. However when the high voltage circuit is operating properly there is no possibility of X-Radiation problem, The basic precaution which must be exercised is to keep the high voltage at the following factory-recommened level.

Note: It is important to use an accurate periodically calibrated high voltage meter.

7-1 The procedure for adjusting high voltage is shown on page 49.

7-2 If high voltage cannot be set to 26KV, immediate service is required the possibility of premature component failure.

7-3 To prevent X-Radiation possibility, it is essential to use specified picture tube.

IMPORTANT SAFETY NOTICE

There are special component used in this CRT displays Which are important for safety. These parts are identified By the international symbol ⚠ on the schematic Diagram and on the replacement parts list. It is essential that theses circuit parts should be replaced with Manufacture's specified parts to prevent X-RADIATION, Shock fire, or other hazards. Do not modify the original design or this will void the original parts and labor guarantee.

2. SPECIFICATIONS

1 Input requirements

1.1 AC power supply

1.1.1 Power source 90~264VAC 50/60Hz

1.1.2 Power consumption Less than 75W

1.1.3 Inrush current Less than 30Ap-p for 1/2 cycle at 110V, less than 60Ap for 1/2 cycle at 240V on cold starting

1.1.4 Input current 1.2 A Max in 110V

1.1.5 Leakage current 0.25mA at AC 110V

1.1.6 Ripple / noise Should not cause any visible interference

1.1.7 Power cord 1.8 meter, Ivory

1.2 Video interface

1.2.1 RGB video Analog 0.7Vp-p positive input impedance 75 OHM

1.2.2 Max PC video signal 950mV with no damage to monitor

1.2.3 Max MAC video signal 1250mV with no damage to monitor

1.2.4 Sync signal Separate or composite horizontal and vertical sync TTL level

1.2.5 Signal memory modes 10 preset modes, 10 user modes (See detail page7)

1.2.6 Plug & play VESA DDC1 / 2B

1.3 Scanning frequency

1.3.1 Horizontal 30KHz to 70KHz

1.3.2 Vertical 50Hz to 160Hz

2. CRT specifications.

ITEM	SPEC
Size	15”
Diagonal	13.82”
Deflection	90°
Persistence	P22 medium short persistence phosphor
Phosphor pitch	0.28mm
Mask type	Anti doming Invar mask mask
Screen finish	Anti-glare, anti-static
Face plate	Filter glass
CRT	TOSHIBA CRT : M36LGE23X205

3 .Power saving

Status	Horizontal Sync.	Vertical Sync.	Power consumption	Power LED
Normal	Yes	Yes	<75W	Green
Power saving	No	Yes	< 5 W	Amber
Power saving	Yes	No	< 5 W	Amber
Power saving	No	No	< 5 W	Amber
Over range	10~29 ± 1kHz or >71 ± 1kHz	10~49 ± 1Hz or >160.5 ± 1.5Hz	< 5 W	Amber

4. Picture display size.

Horizontal size 270 ± 4mm

Vertical size 202 ± 4mm.

5. Color temperature: Using the CIE color temperature coordinate system.

5.1 Chrominance Color 9300°K: x = 0.283± 0.020
y = 0.297±0.020
Color 6500°K: x = 0.313±0.020
y = 0.329±0.020

5.2 Luminance (Light output) in 60 KHz 1024*768 mode

5.2.1 High light : At 70mm x 70mm white pattern , Brightness 50% , Contrast 100% : **Y = 46 ± 4 FL**

5.2.2 ABL : At full-white pattern , Brightness 50% , Contrast 100% : **Y = 30±2FL.**

5.3.3 Low light : At Dark pattern Brightness 100% Contrast 0 % :**Y = 0.3~1.3 FL**

6. Physical specifications.

Monitor dimension.

Height : 368 mm Width : 365 mm Depth : 394 mm Monitor weight : 12.5 Kg.

Carton dimension.

Height : 455 mm Width : 448 mm. Depth : 483 mm. Gross weight : 14.5 Kg.

7. Environmental conditions.

7.1 Temperature and humidity at operation : 0 ~ 40 °C and 5% ~ 95% RH（without condensation）.

7.2 Temperature and humidity at storage : -40 ~ 60 °C and 5 ~ 95% RH Less than 6 month.

7.3 Altitude: Operating : 0 ~ +3000 metres (~ 10000 feet).
Non-operating : 0 ~ +12000 metres (~ 36000 feet).

3. TIMING CHART

MODE NO.	1	2	3	4	5	6	7	8	9	10
MODE NAME	VGA	VGA	VESA	VESA	VESA	VESA	VESA	VESA	MAC	MAC
	640X 400	640X 480	640X 480	800X 600	800X 600	1024X 768	1024X 768	1280X 1024	640X 480	832X 624
HORIZONTAL DOTS	640	640	640	800	800	1024	1024	1280	640	832
VERTICAL LINES	400	480	480	600	600	768	768	1024	480	624
PIXEL CLOCK (MHZ)	25.175	25.175	31.500	49.500	56.250	78.750	94.500	108.000	30.240	57.270
HORIZONTAL FREQ (KHZ)	31.470	31.470	37.50	46.875	53.674	60.023	68.677	63.981	35.000	49.717
SYNC. POLARITY	-	-	-	+	+	+	+	+	-	-
A H.TOTAL (us)	31.778	31.778	26.667	21.333	18.631	16.660	14.561	15.630	28.571	20.115
(PIXELS)	(800)	(800)	(840)	(1056)	(1048)	(1312)	(1376)	(1688)	(864)	(1152)
B H.SYNC (us)	3.813	3.813	2.032	1.616	1.138	1.219	1.016	1.037	2.116	1.118
(PIXELS)	(96)	(96)	(64)	(80)	(64)	(96)	(96)	(112)	(64)	(64)
C H.BACK PORCH (us)	1.907	1.907	3.810	3.232	2.702	2.235	2.201	2.296	3.715	3.911
(PIXELS)	(48)	(48)	(120)	(160)	(152)	(176)	(208)	(248)	(96)	(224)
D H.ACTIVE (us)	25.422	25.423	20.317	16.162	14.222	13.003	10.836	11.852	21.164	14.528
(PIXELS)	(640)	(640)	(640)	(800)	(800)	(1024)	(1024)	(1280)	(640)	(832)
E H.FRONT PORCH	0.636	0.636	0.508	0.323	0.569	0.203	0.508	0.444	2.116	0.558
(PIXELS)	(16)	(16)	(16)	(16)	(32)	(16)	(48)	(48)	(64)	(32)
VERTICAL FREQ (HZ)	70.080	59.940	75.00	75.000	85.000	75.029	85.000	60.200	66.667	74.530
SYNC POLARITY	+	-	-	+	+	+	+	+	-	-
OV. TOTAL (ms)	14.268	16.648	13.333	13.333	11.756	13.328	11.765	16.661	15.000	13.417
(LINES)	(449)	(525)	(500)	(625)	(631)	(800)	(808)	(1066)	(525)	(667)
PV. SYNC (ms)	0.064	0.064	0.080	0.064	0.056	0.05	0.044	0.047	0.086	0.060
(LINES)	(2)	(2)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Q V.BACK PORCH (ms)	1.112	1.049	0.427	0.448	0.053	0.466	0.524	0.594	1.114	0.784
(LINES)	(35)	(33)	(16)	(21)	(27)	(28)	(36)	(38)	(39)	(39)
R V.ACTIVE (ms)	12.711	15.254	12.800	12.800	11.179	12.795	11.183	16.005	13.714	12.552
(LINES)	(400)	(480)	(480)	(600)	(600)	(768)	(768)	(1024)	(480)	(624)
S V.FRONT PORCH (ms)	0.381	0.381	0.027	0.021	0.019	0.017	0.015	0.016	0.086	0.021
(LINES)	(12)	(10)	(1)	(1)	(1)	(1)	(1)	(1)	(3)	(1)

4. FRONT PANEL FUNCTION CONTROL DESCRIPTION

Key function define

1	▽	△	2

▯	Power switch

(▭ Pressing key)

Normal key function

1	▼	▲	2	P	Power Switch
1	▼	▲	2	P	Adjust to increase value and move up the cursor
1	▼	▲	2	P	Adjust to decrease value and move down the menu
1	▼	▲	2	P	To select the main menu and move sub-menu curser.
1	▼	▲	2	P	To display OSD menu
1	▼	▲	2	P	Recall Contrast or Brightness depend on sub-menu

Start up key function

1	▼	▲	2	P	Write Burn-in flag to EEPROM (Enter Burn-in)
1	▼	▲	2	P	Force into Burn-in mode, when power on no signal
1	▼	▲	2	P	Clear Burn-in flag (Exit Burn-in mode)
1	▼	▲	2	P	All mode recall function

Maintain key function by the Burn-in flag.

When Burn-in on: Enable the maintain key function

When Burn-in off: Disable the maintain key function

Maintain key function

1	▼	▲	2	P	Enter Factory mode

OSD operation

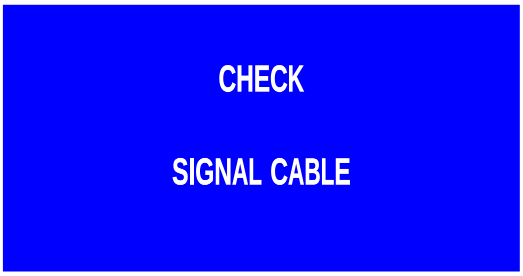
1. Contrast: Adjust the ratio of luminance.
2. Brightness: Adjust the ratio of black level.
3. H.Size: Increase or decrease horizontal size of picture.
4. H.Position: Move the picture toward right or lift sides.
5. V.Size: Increase or decrease vertical size of picture.
6. V.Position: Move the picture toward top or bottom.
7. Pincushion: Cause right and lift sides become barrel or pin.
8. Pin Balance: Cause right and lift sides become balance curve.
9. Trapezoid: Adjust ratio between the horizontal size at top and the horizontal size at bottom of picture.
10. Parallel: Cause the picture become parallel.
11. Moire: Adjust picture moire.

MAIN MENU 2

1. ViewMeter: Show information of the input H/V frequency.
2. ViewMatch Color: Selectable color temperature include 9300K, 6500K and USER
3. Language: Provide OSD menu 5 languages for user to select.
4. Memory Recall: Reset picture's parameters to the preset values.

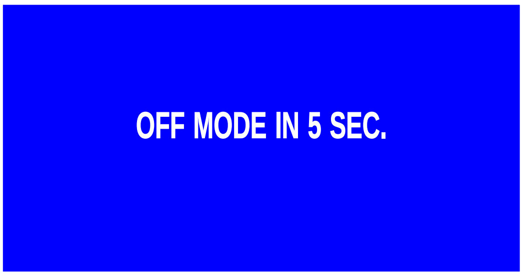
DIAGNOSTIC MESSAGE:

When power is turned on a moment, but no signal input then show:



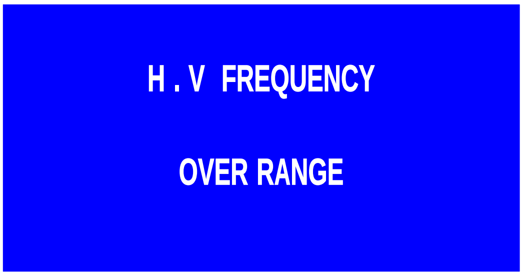
A. Signal Cable disconnection in any condition.
B. PIN 5. In D-SUB is as Low / High detection.
Display time : 5 seconds.

If monitor is on "power saving" mode, it will show:



A. Display time : 5 seconds.
B. Off mode in 5 sec. Display massage
C. When entering power-saving, press any key will re-display these messages. Display time : 15 sec

If Horizontal, Vertical frequency are over range, it will show:



A. Display time : 5 seconds.
B. When entering power-saving, press any key will re-display this message. Display time : 15 sec.

5. ADJUSTING PROCEDURE

1. **Deflection presets.**
   Control pots VR101, VR401, VR403, Focus VR are set at middle point; Screen VR set to MIN.
2. **Power supply alignment.**
   2.1 Input 640*480 / 70 Hz 31KHz. signal with dark pattern
   2.2 Adjust VR101 until DC = 75V± 0.3V at TP201.
   2.3 Adjust VR403 until voltage at TP208   = 66 V ± 0.3V
   2.4 Check output Q206 at TP205 voltage must be between 11.7V to 12.3V.

3. **Focus adjustment.**
   3.1 Apply signal all “ me ” pattern at 1024*768 /75Hz mode.
   3.2 Set brightness 50%, contrast 100%.
   3.3 Set focus control for best focus.

4. **Manual white balance adjusting**

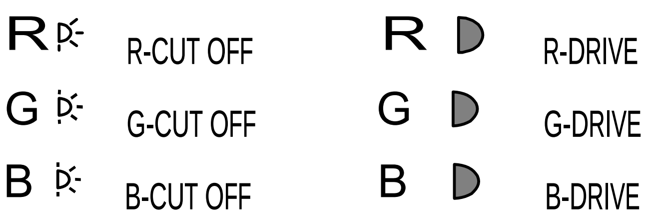
1	▽	△	2

[▯] Power switch

*** Before adjusting manual " white balance", you must adjust picture to good size and center. ***

4.1 Enter to Burn-in mode
Press ▲ and **2** and Power On. Then press ▲ and **2** around 5 seconds after power On.
4.2 Apply Chroma to white pattern to degauss the monitor.
4.3 Apply signal of Chroma to spec (See note. 2) and black pattern then Power Off monitor.
4.4 Enter to Factory mode
Press **1** and ▼ and Power On. Then press **1** and ▼ around 5 seconds after power is On.
4.5 Press “ ▼ " for displaying OSD (after entry to the Factory mode).
If “Factory mode” doesn't appear in OSD. Please try Item 4.1-4.4 again. (See note 1)
This key ▼ is for selecting or entering to each function menu.
▲ and **2** are for moving the cursor to each menu and for adjusting decrease and increase respectively. Press ▼ to enter to each function in OSD menu.

Start adjust 9300K
4.6 After entering into “Factory mode “ , move cursor to contrast and adjust Contrast to 100% then adjust Brightness to 100%. Then go to OSD position function and move OSD to corner of display.
4.7 **Low light adjusting :** Go to R-CUT OFF, and adjust R-CUT OFF to 0% on OSD.
Repeat this method for G-CUT OFF and B-CUT OFF too.



4.8 Observe which color is the most bright and that color is a strong gun. The strong gun shall be fixed the cut off at 0% .

4.9 Move OSD to corner of display and use the probe of color analyzer machine to measure color. Then adjust the other guns to meet x, y spec (See Note. 3)

4.10 Adjust G2 to meet Y (Low Light) spec. (See Note. 3)

4.11 If x , y are out of range , adjust R,G,B CUT OFF again but still fix strong gun at 0% and adjust G2 until meet spec x, y and Y (Low light). (you must confirm the value by closing OSD and use the probe measure again. If out off spec must adjust until in spec.

4.12 **High light adjusting :** Apply a white block pattern and adjust brightness to 50%. **This step shall not adjust G2**. **!!!**

4.13 Adjust R,G,B-DRIVE level until meet spec x , y and Y (High Light). (See Note. 3) (You must confirm the value by check while OSD disappear. If out off spec must adjust until in Spec)

4.14 If 9300 color temperature adjusting finish, move highlight (cursor) to " S9 " (SAVE 9300) function, then press "▼ and " **2** " respectively for saving the white balance data of 9300 into EEPROM (IC302)

4.15 After finish adjusting 9300 , then adjust ABL by applying full white pattern. Set brightness to 50%, contrast to 100% then adjust ABL in OSD to meet Y (ABL) spec (See Note. 3)

Start adjust 6500K

4.16 Apply blank pattern for Low Light adjusting. Adjust brightness to 100% and contrast to 100%.

4.17 **Don't adjust G2.** Only adjust R,G,B_CUT OFF on OSD to meet spec x , y and Y (Low Light of 6500 K , see Note3) (Method to adjust x , y , Y are same as 9300 adjust , but different on spec)

4.18 Adjust brightness to 50%. Apply a white block pattern and adjust R,G,B-DRIVE to meet spec x, y ,Y (High Light of 6500K).

4.19 If 6500 color temperature adjusting finish, then move highlight (cursor) to " S6 " (SAVE 6500) function , then press ▲ and **2** respectively for saving the white balance data of 6500 into EEPROM (IC302)

4.20 Turn off monitor for quit from Factory mode.

4.21 Press "▲ " key , Power ON again . Then press ▲ around 5 seconds after power is on for canceling the Burn in mode.

<u>Note.1</u>
1. If turn off monitor after enter Factory mode, but adjustment is not finish yet. Monitor will not save data and exit Factory mode. So you must repeat step 4th for easily enter Factory mode again.
2. Before adjusting white balance and size alignment, you should burn in Monitor for 30 min at least.

5. Manual size alignment adjusting

5.1 Enter to Burn-in mode

Press ▲ and **2** to Power On. Then press ▲ and **2** around 5 seconds after power On.

5.2 Apply signal from the pattern generator (See page 7) with full white or crosshatch pattern. Adjust brightness to 50 % and contrast to 100%, Power Off the monitor.

5.3 **Enter to the Factory mode :** Press **1** and ▼ to Power On. Still press **1** and ▼ around 5 seconds after power On.

5.4 Press “ ▼ “ for displaying OSD (after the screen entrered to the Factory mode).
If “Factory mode” in OSD doesn't appear, try Item 5.3 again. (See note.1)
This key ▼ are for selection or enter to each function menu.
▲ and **2** are for move the cursor to each menu and for adjusting decrease and increase , respectively. After ▼ press to enter to each function in OSD menu.

5.5 Use function key to adjust H-size to meet 270 +/- 3mm, V-size 202 +/- 3mm, H-Position and Ver position to let picture be in the center with the edge of front bezel. Then use function keys to adjust “ Parallel”, “Pincusion” , “Trapezoid” , “Pin balance” for making display edge to straight vertical and no line distortion.

5.6 Apply Then timing then repeat step 5.5 until complete every timing.

5.7 Aadjust size to follow spec and finish all timing. Move highlight (cursor) to “ SI “ (STORE IMAGE) function and press key “▼ “ for entering in the “ SI ” function, press key “ **2** “ for confirming store image data into EEPROM (IC302).

Size alignment must be done in every preset timing follow specification (page 5-6).

5.8 Check image of every timing to keep anything within spec.

5.9 Turn off monitor for exiting Factory mode and reset monitor.

5.10 Press “▲ “ key , Power ON again . Then press ▲ around 5 seconds after power On. for canceling the Burn in mode.

Note. 2 Timing spec.

Model	White balance signal	Raster center adjusting	Number of preset timing
E55-2	800x600/ 85 Hz	1024*768 / 75 Hz	10(See page7)

Note. 3 Color adjusting spec.

MODEL		E55-2
9300K	x	0.283 ± 0.003
	y	0.297 ± 0.003
6500K	x	0.313 ± 0.003
	y	0.329 ± 0.003
Y (Low light)		0.7 ± 0.2 Fls.
Y (High light)		46 ± 1 Fls.
Y (ABL)		30 ± 0.5 Fls.

6. CIRCUIT DESCRIPTION

1. POWER SUPPLY

1.1 Power supply.

A. Primary Side.

The raw DC voltage is built on C101 from AC line voltage through EMI filter and bridge rectifier CR 101, then composes with main transformer (T101) switching MOSFET (Q101) and PWM IC (IC101) to form a DC-DC voltage converter by flyback switching topology, which means that the power energy is pumped up at primary winding of transformer during duty "ON" cycle, then transfer the stored energy to primary side, and voltage regulated by PWM IC (3842) using way of pulse width modulation. The IC101 starts up through some components composed of R103,R104,R105,Q102,ZD102 to build up VCC voltage at pin 7 and supplied by transformer once secondary voltage is established. IC101 have to work synchronously with horizontal sync by feeding flyback pulse through C110,R120, C108 and D113 composed a soft-start circuit to prevent over-stress occurred during power start.

The TP201, 75V voltage can be adjusted through VR101.

B. Secondary

Each raw of DC voltage output from T101.

a. TP201 voltage output from T101 pin10 and is rectified by D202, C201.
b. TP202 voltage output from T101 pin9 and is rectified by D203, C202.
c. TP203 voltage output from T101 pin14 and is received by D205, C205.
d. TP204 voltage output from T101 pin15 and is rectified by D206, C206.
e. TP205 voltage output from T203 is rectified by Q206, ZD201 and D208.
f. TP207 voltage output from TP204 and is rectified by R217,C211,ZD202.

1.2 Power saving.

The EPA power management state as follows.

H.syns input	V.sync input	Pd	12 V.	6.3 V. (heater)	LED
Yes	Yes	H	Yes	Yes	Green
Yes	No	L	No	No	Amber
no	Yes	L	No	No	Amber
No	No	L	No	No	Amber

PD (Power Down) = IC301 (MCU) pin18 output.

PD is at low level controlled by IC301 . So no output from Q206 (12V)

no output fromQ208 (6.3V)

2. VERTICAL

2.1 Auto SYNC Deflection control and B+ control circuit Horizontal and vertical sync through IC401 TDA9115 transmit.

Deflection controller IC401.

a. The control input (V-position, H-position, V-size, H-size, Pincushion, Pin-Balance, Trapezoid, Parallelogram,corner, moire) are use I^2C control.
b. SYNC input.

H-sync (pin1) From IC301 pin33.
V-sync (pin2) From IC301 pin32.
c. Output.
  * B^+ Driver (pin28).
  * H-Driver (pin26).
  * EW-Driver (pin24).
  * Vout (pin23).

2.1.1 Horizontal.

a. H-sync inputs through pin1, then take a HFLB pulse from FBT pin5 to IC401 for AFC to make pin26 H-Driver output at the same time.

b. Pin5 and pin6. C429, R471, control horizontal hold in range.

2.1.2 Vertical.

a. V-sync outputs from MCU IC301 pin32 to IC401 pin2, then IC401 release V.out from pin23, pin21, to IC501 TDA9309 pin7, pin1.

b. V.outputs to vertical hold in range is controlled by pin22 IC401 (C508).

2.1.3 B^+ control.

Take a pulse from FBT pin5 and accumulates to become a DC voltage via D423, C437, then transformed by VR403 to a conjunction to IC401 pin15 (≅5V) outputs pulse by pin28 via Q202 to boost converter circuit.

2.2 Vertical deflection.

a. IC401 pin23 output to IC501 (TDA9309) pin7, then IC501 pin5 and pin7 make vertical deflection output.

b. Vertical blank (IC501) pin3 take a blanking pulse. After passing Q419 , Q420 buffer can supply video blanking signal.

2.3 Boost converter.

The Booster converter mainly composes of n-channel MOSFET Q202 choke L201 capacitor C204 andrectifier diode D204. IC401 pin28 B^+ driver output via Q204, Q205, Q202 to driver Booster converter and provide a DC-voltage to provide B^+ H-output circuit use As H-freq. Change IC401 pin28 B^+ driver will change its output. Booster converter will also change the B^+ .

2.4 X-RAY radiation protection.

FBT pin5 output pulse through D423 and C437 rectify to DC voltage and through D418,ZD405 to IC401 pin25. When anode voltage abnormal increase high, FBT pin5 and IC401 pin25 voltage will be increased too. If IC401 pin25 rise up till reach around 8V. IC401 X-RAY protection circuit immediately active H-Driver and B-Driver , VOUT no output.

The X-RAY radiation protection circuit is used in this monitor is a latching type the monitor will shut down and continue until turn-off the monitor with power switch.
And monitor can recovery by Turn ON the power switch.

3. HORIZONTAL

3.1 Horizontal driver circuit.

The output of IC401 pin26 H-Driver connect to Q402 H-Driver transistor makes Q402 active ON/OFF function push H-output Q401 to reach secondary via induction of T402. For T402 is a transformer of reduced voltage and converted pole, Q401 will be turn off when Q402 is on (on the contrary) when Q402 is turn off and Q401 will be on.

3.2 Horizontal output circuit.

Horizontal output circuit is composed by Q401. Horizontal Transistor,T401(FBT), D401, D402, C401 and C416. H-Driver circuit output via T402 to switch Q401 ON/OFF to output saw tooth wave and make DY able to control the circuit scanning of electron in the CRT.

L404, C414, C415 modify Horizontal linearity switching individually via Q414, RL401

3.3 EW-Pincushion and width control circuit.

The voltage across C420 can be varied in accordance with vertical parabolic wave form and DC voltage which is generated by two stage drive Q411, Q412, Q409. The peak yoke current is increased in proportion to the voltage across C414 as the voltage across C420 is decreased for compensating the pincushion effect. The parabolic waveform and DC voltage are generated from IC401 pin24.

4. VIDEO

4.1 Video amplifier (IC601).

The video amplifier module is composed of three amplifiers for Red, Green, Blue channel. The video input signal are fed to the video preamplifier IC601 pin5 is Red, pin6 is Green and pin7 is Blue, through AC coupling capacitor (C601, C602, C603).

Cut off and drive voltage are controlled by IC301via I^2C bus . Output of IC601 pin 16 , 15 and 14 to control the RGB cut off voltage through IC604. Output IC604 are DC voltage for D613, D614 ,D615 and C626, C627, C628 clamping the RGB cathode voltage.

IC603 output amplifier for R,G,B channel.

4.2 On Screen Display (OSD : IC602).

IC602 is the on screen display generator, pin5 for H-blank input, pin10 for V- blank input.

The IC602 is controlled by IC301 via SDA, SCL bus IC602 (pin7, pin8).

The on screen display signal is output from pin13, pin14 and pin15. OSD fast blanking from pin12 for delete display in area of OSD showing. The fast blanking is active high output = 5V while showing OSD. If no using OSD, so this pin shall be 0V.

4.3 Auto Beam Limit CCT (ABL).

When beam current pass through R447 over 400 uA., the voltage build at base of Q418 will be low enough to turn on Q418, then the voltage of pin22 of IC601 will be pulled down accordingly to reduce the video

Pre-amplifier gain output.

4.4 Brightness Control.

Brightness is controlled by varying the DC voltage of RGB output from IC601. Through I^2C from the IC301..

4.5 Blanking CCT.

Vert : IC501 (TDA9309) pin3 vertical blanking pulse are fed to the base of Q420 to pull down the G1 voltage to –190 V.

Hor : Horizontal blanking pulse are fed to IC601 pin24 and let video O/P amp cut off during the period of horizontal retrace

4.6 Mute

While mode was changing, IC301 pin19 pull high to turn off Q420. The G1 voltage will down to –190 V then CRT will cut off the video output.

5. MICRO CONTROLLER UNIT (IC301)

5.1 H.Sync/V.Sync Processor.

HS/VS input pin39 (HS), pin40 (VS). IC301 individually to work on frequency polarity process of H+V and power saving, then output horizontal sync (pin33) and vertical sync (pin32) of positive polarity to IC401 pin1, pin2.

5.2 PWM Control.

The PWM control of IC301 is pin1 and pin2. The PWM output via R, C after rectified may control each function. ,Pin2 to control ABL (ABL adjusting is available only in factory mode)

5.3 Power saving / Mute / LED control.

IC301 pin18 are power saving control pin. The condition of power saving and mode change pin19 will change from Low to Hi to active MUTE function for 1-2 seconds.

	Normal	Active
Mute	L	H
PD (pin18)	H	L

(Power saving)

IC301 pin18 (SUS) function as LED control, the mode is as listed.

	Power On	Power saving	Over range frequency
Pin18	Hi	Low	Low

5.4 Linearity control the CS2 Output from pin22 of IC301 through R333, JW302 to R440 , Q415 and Q414 and select C415 to be parallel with C414 in low frequency. To count H-SYNC by the output frequency, then output the cumulating as listed.

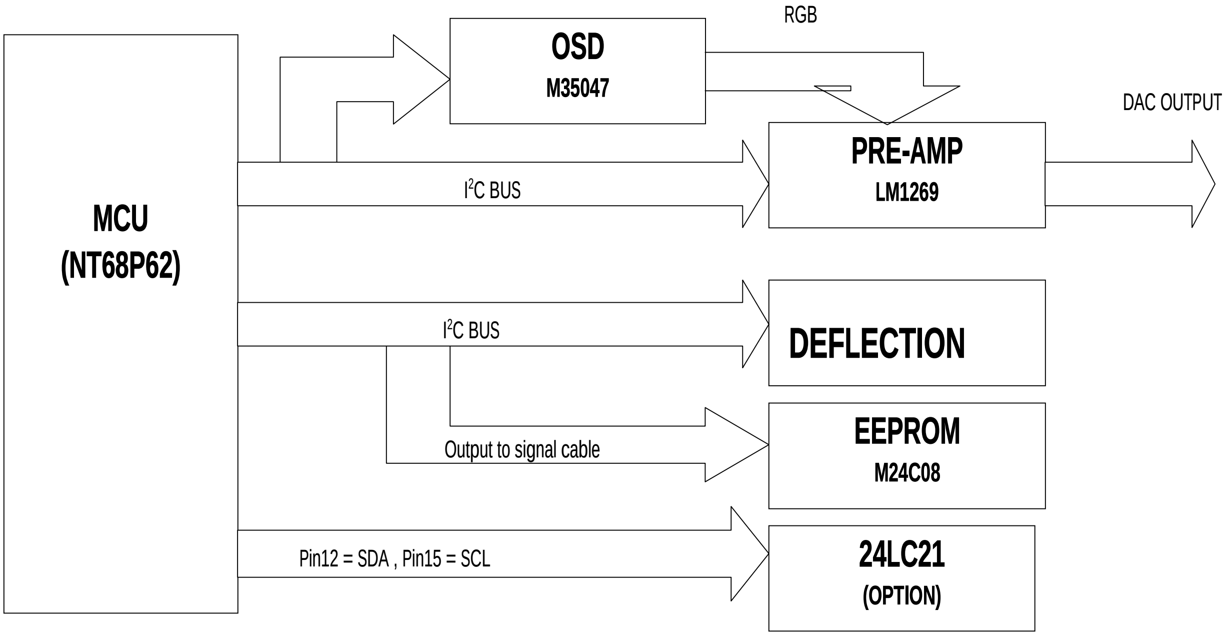
Freq.	Pin21	Pin22
< 36.5 KHz	0	0
36.5 KHz ~ 41 KHz	1	0
41KHz ~ 52 KHz	0	1
52 KHz ~ 70 KHz	1	1

5.5 Key Control.

IC301 pin27~pin30 function as DAC switch input to control OSD display function.

5.6 I^2C Bus.

IC301 have two groups I^2C bus to control E^2PROM, IC401 deflection IC, Auto alignment, IC601 pre-AMP,
IC602 OSD IC function at pin 11,12 and pin13,14.



6. WAVE FORM

Measuring Condition

Timing : 53.6KHz./85Hz. (except figure12)
Pattern : Cross hatch pattern
Contrast: 100%
Brightness: 50%

AC input :
* 110V and 220V for testing on primary side of T101.
* Only 220V for testing on secondary side of T101.
(Because voltage at any point on secondary side of T101 are same at any level of AC input usually.

Equipment : Oscilloscope 100 Mhz.

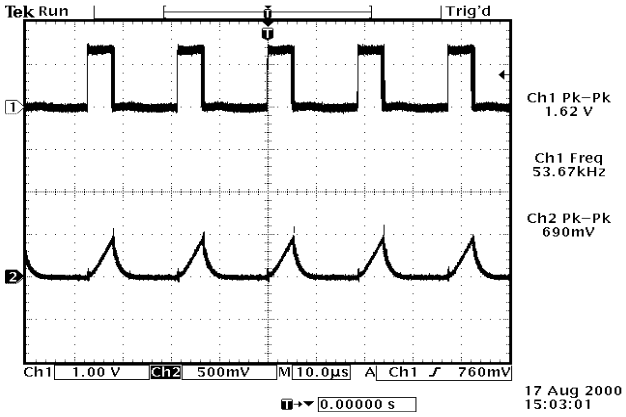


Figure 1

Vin = 110 VAC

CH1 : IC101 Pin 6

CH2 : IC101 Pin 3

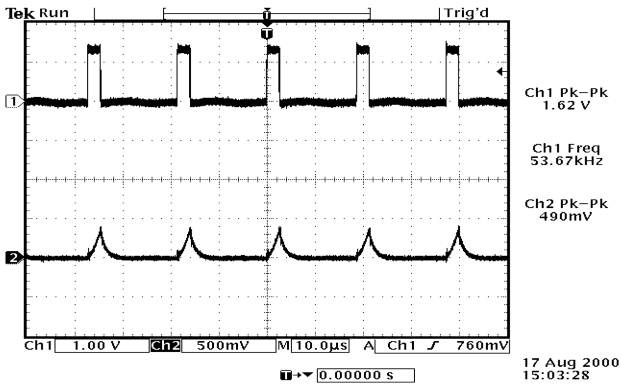


Figure 2

Vin = 220 VAC

CH1 : IC101 Pin 6

CH2 : IC101 Pin 3

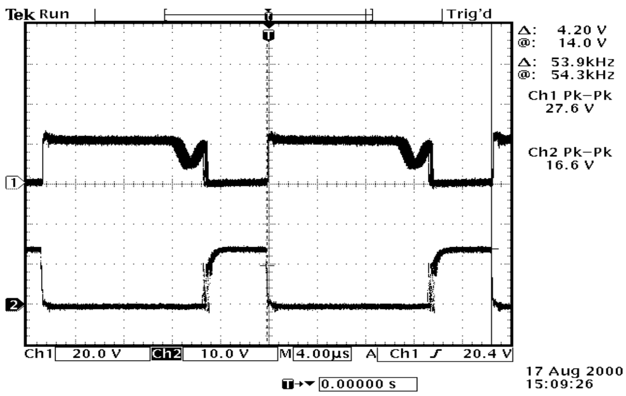


Figure 3

Vin = 110 VAC

CH1 : Q101 Pin D

CH2 : Q101 Pin G

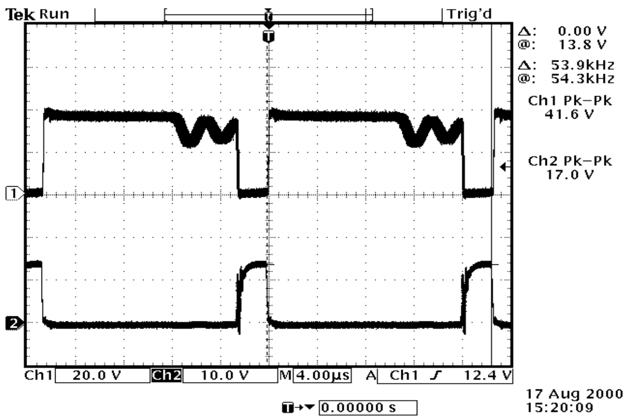


Figure 4

Vac = 220 Vac

CH1 : Q101 PinD

CH2 : Q101 Pin G

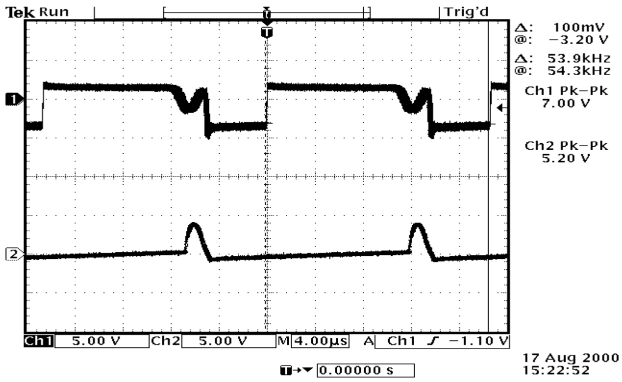


Figure 5

Vin = 110 Vac

CH1 : T101 Pin1

CH2 : IC101 Pin 4

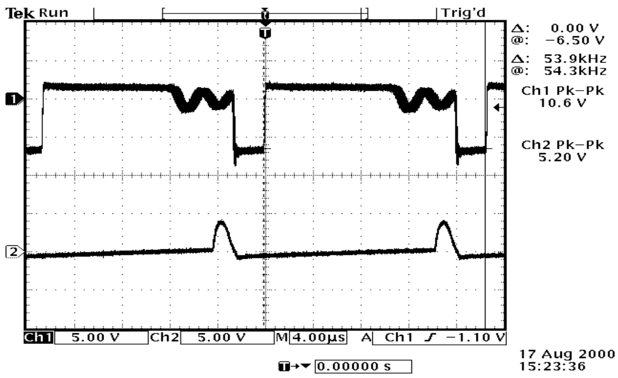
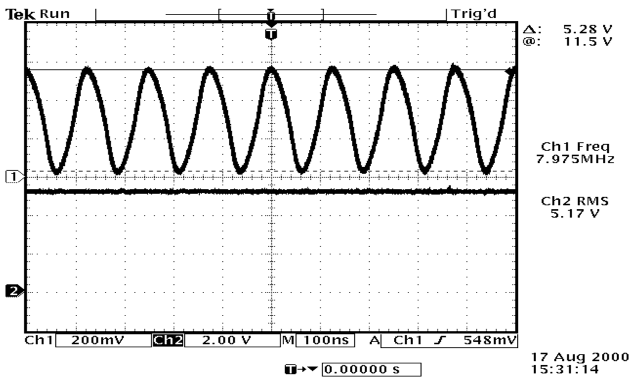


Figure 6

Vin = 220 Vac

CH1 : T101 Pin1

CH2 : IC101 Pin 4



Figuer 7

Vin = 220 VAC

CH1: IC301 Pin 7

CH2 : IC301 Pin 5

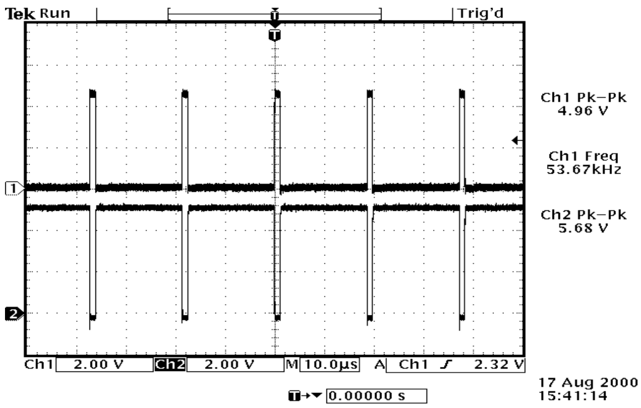
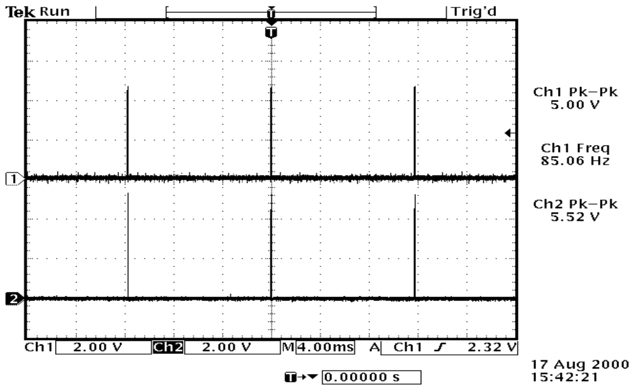


Figure 8

CH1 : IC301 Pin39 H.sync input

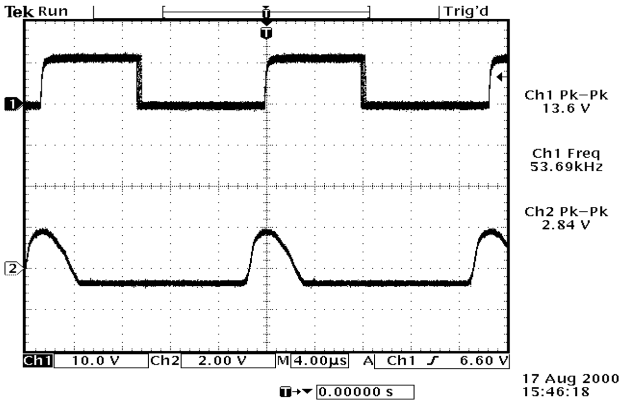
CH2: IC301 Pin33 H.sync output



<u>Figure 9</u>

CH1 : IC301 Pin 40 V.sync input

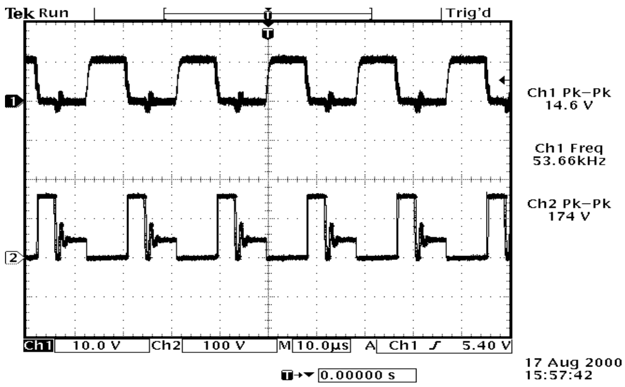
CH2 : IC301 Pin 32 V.sync output



<u>Figure 10</u>

CH1 : IC401Pin 28 B + Drv.

CH2 : IC401 Pin 12 H. FLY



<u>Figure 11</u>

CH1 : Q202 Pin G

CH2 : Q202 Pin D

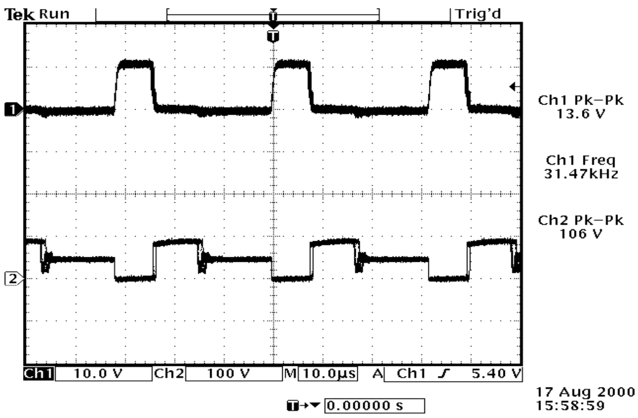


Figure 12

CH1 : Q202 Pin G

CH1 : Q202 Pin D

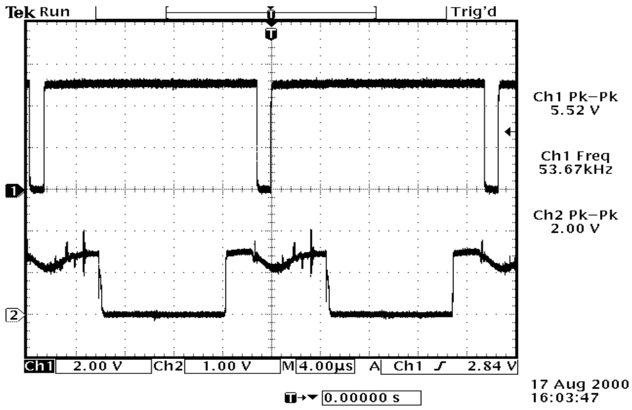


Figure 13

CH1 : IC401 Pin 1 H.sync input

CH2 : IC401 Pin 26 H.Drv

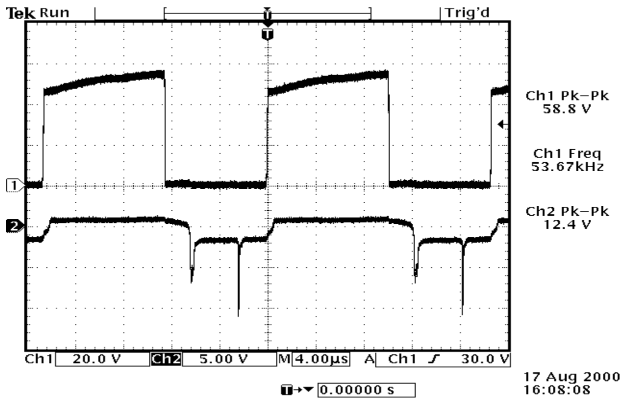


Figure 14

CH1 : Q402 Pin C

CH2 : Q401 Pin B

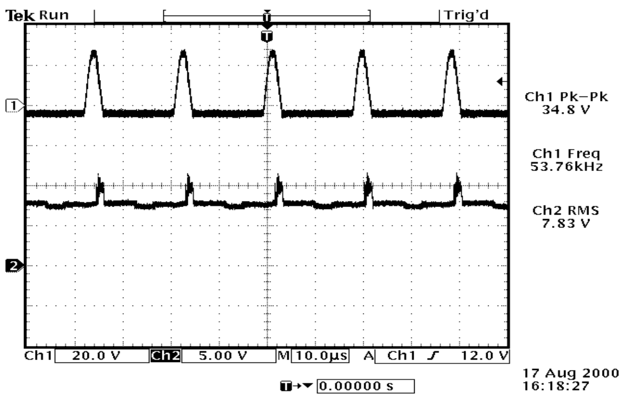


Figure 15

CH1: D423 Pin A

CH2 : ZD405 Pin A (X-ray protection)

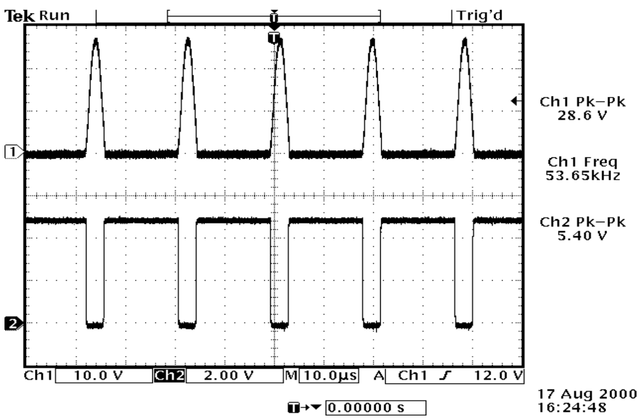


Figure 16

CH1: H.FLY (R445)

CH2 : Q403 Pin C H. blank

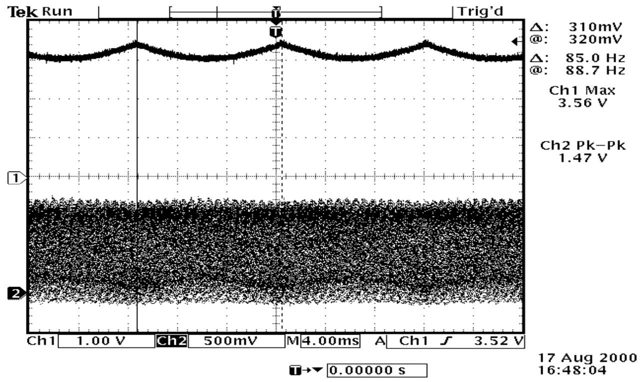


Figure 17

CH1 : Q412 Pin B   EW.Drv

CH2 : Q409 Pin B

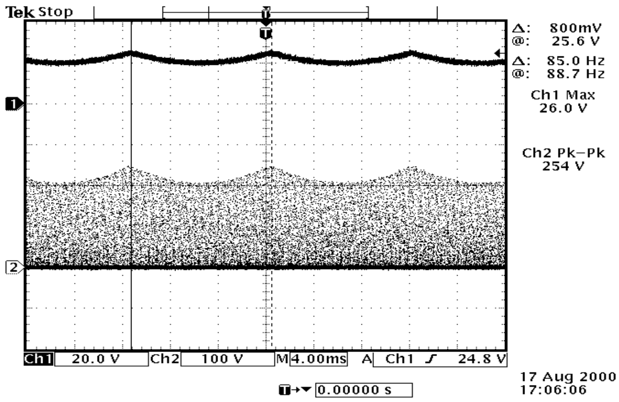


Figure 18

CH1 : Q409 Pin C

CH2 : D402 Pin K

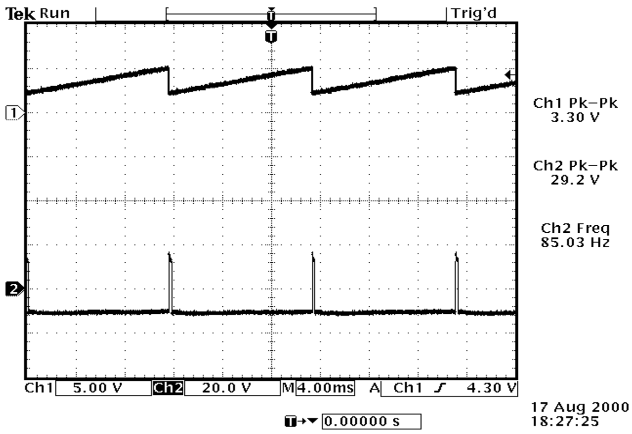


Figure 19

CH1 : IC401 Pin 23   V. out

CH2 : IC501 Pin 3   V. blank

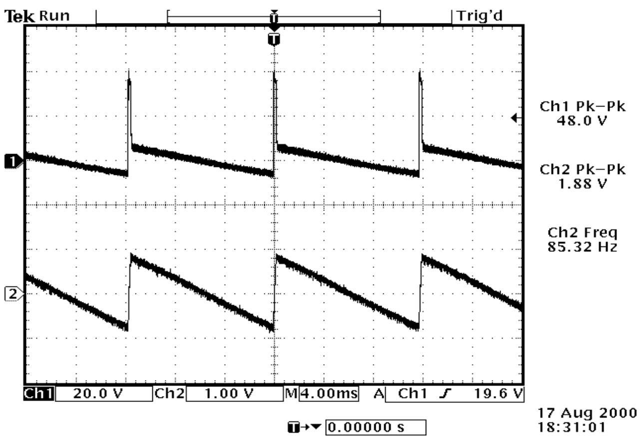
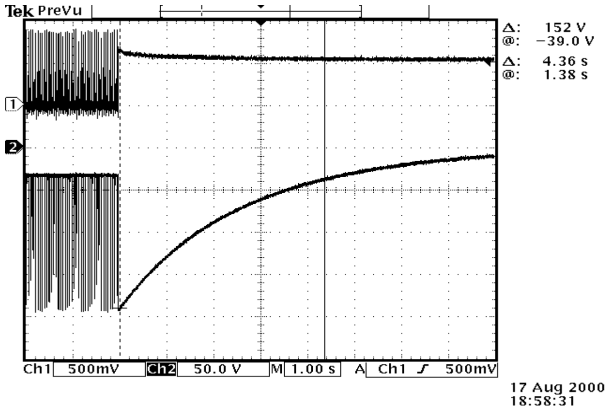
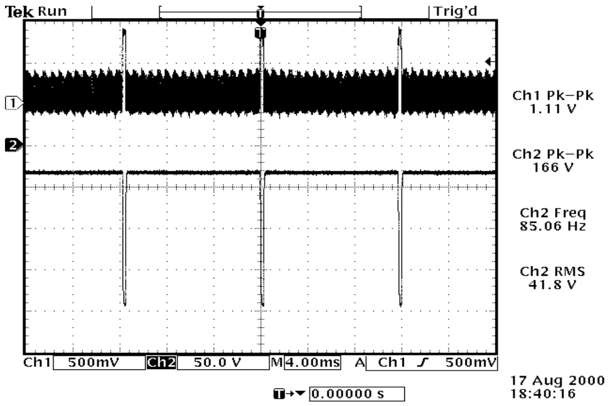
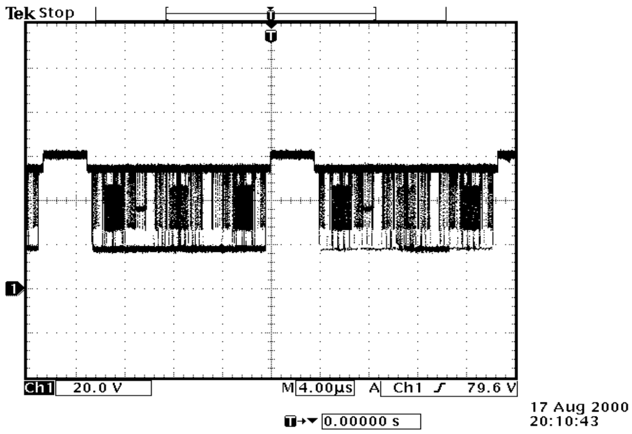
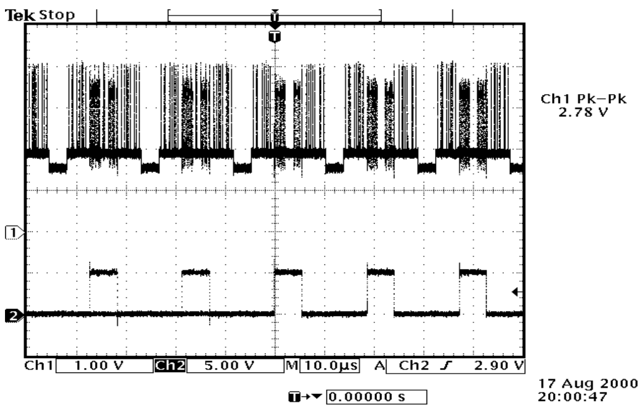


Figure 20

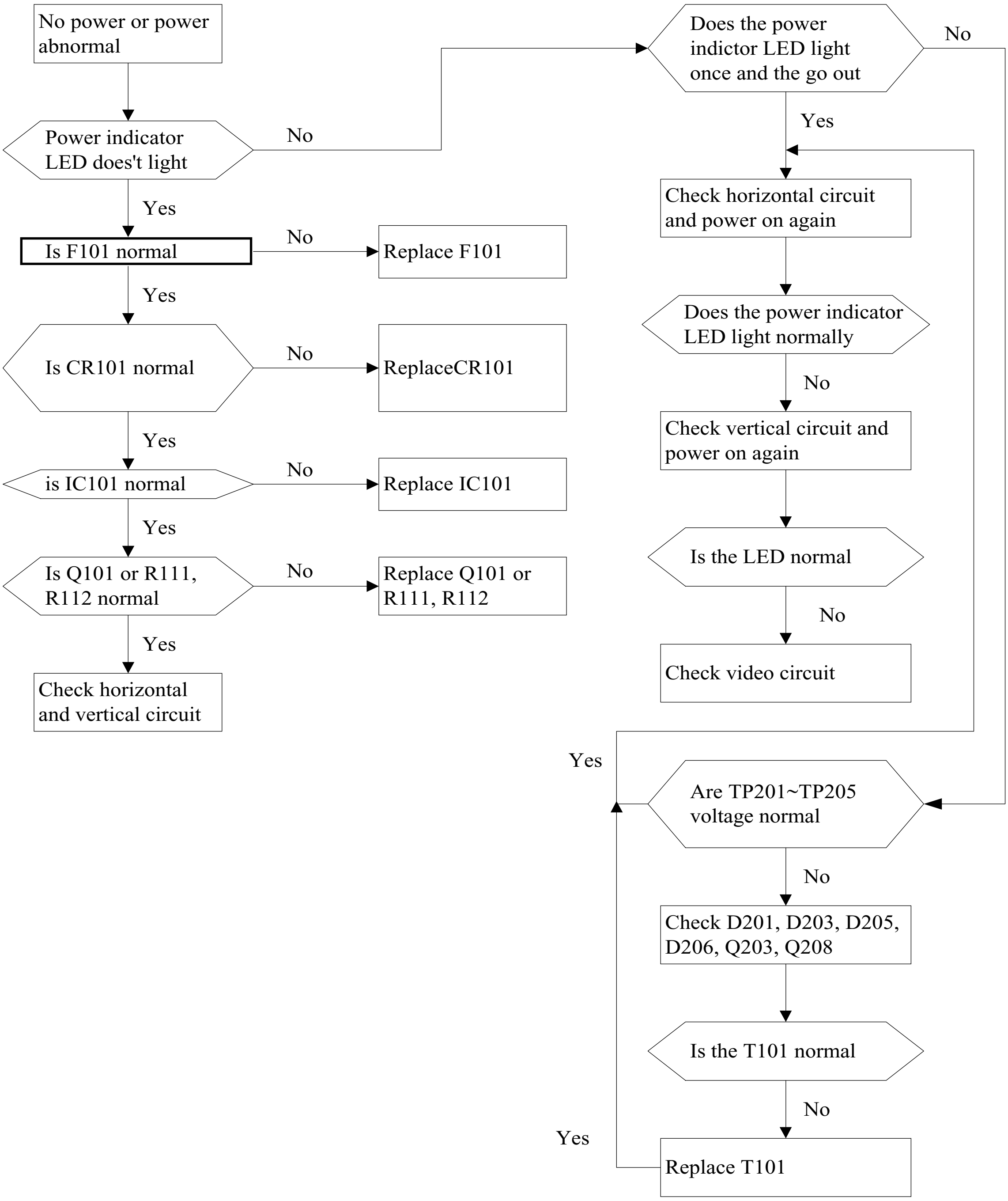
CH1 : VDY +

CH2 : VDY –

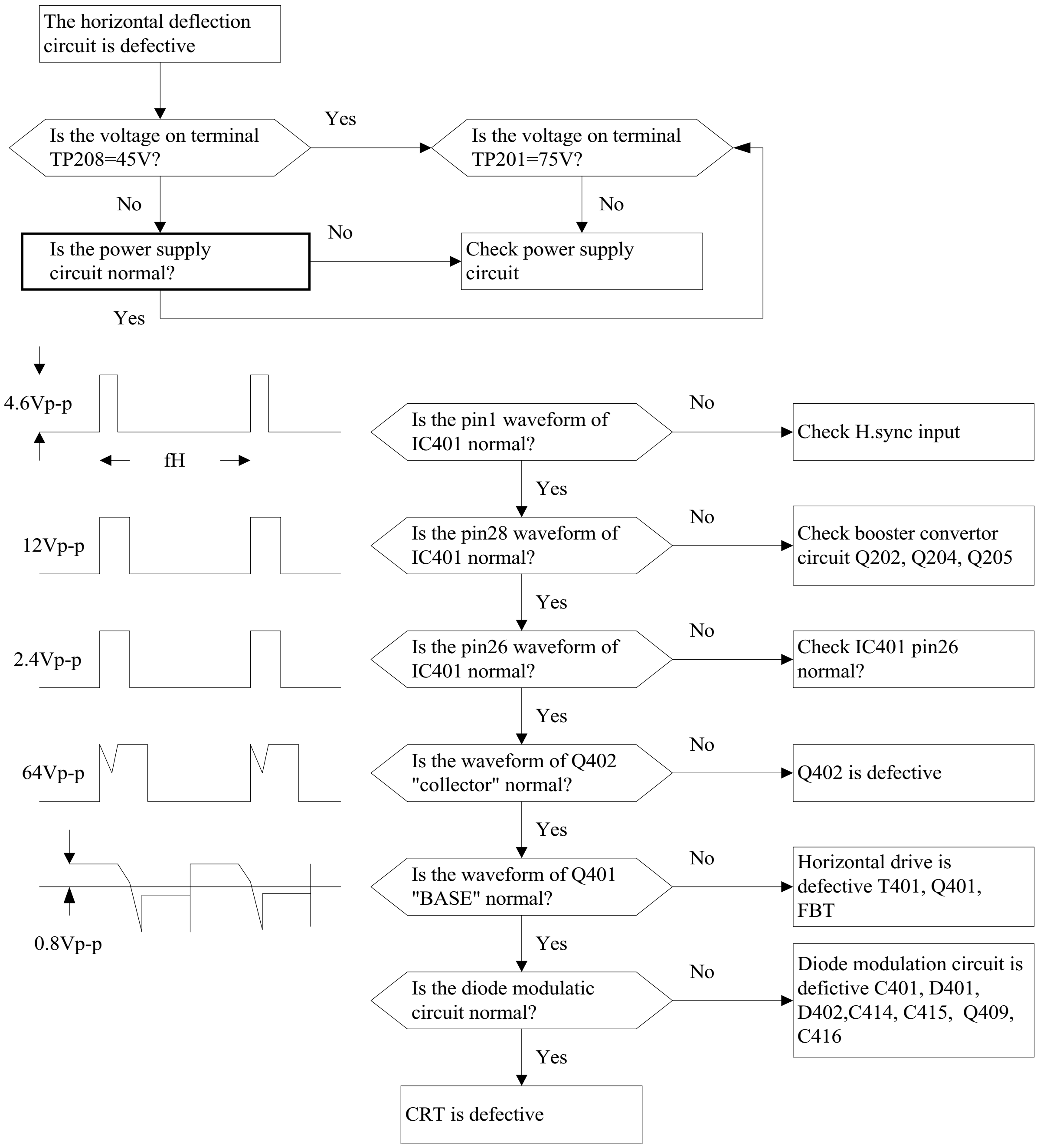
	**Figure 21** CH1 : Q420 Pin B CH2 : Q420 Pin C : G1 voltage (V Blanking)
	**Figure 22** CH1 : Q420 Pin B CH2 : Q420 Pin C : G1 voltage While power off (spot killer)
	**Figure 23** CH1: IC603 Pin 1 Red output to cathod (CRT pin). (cross hatch pattern)
	**Figure 24** CH1: IC601 Pin20 Red input CH2 : IC602 Pin12 Fast blanking output while showing OSD

7. TROUBLE SHOOTING FLOW CHART

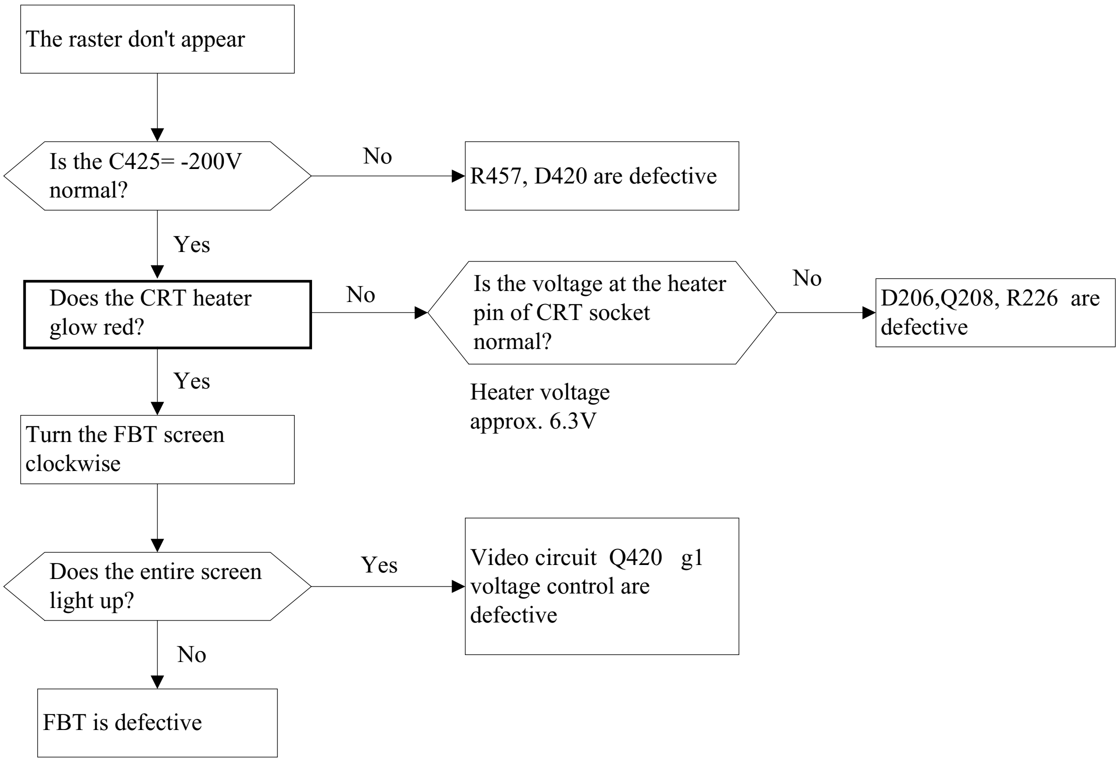
1. Power supply is defective.



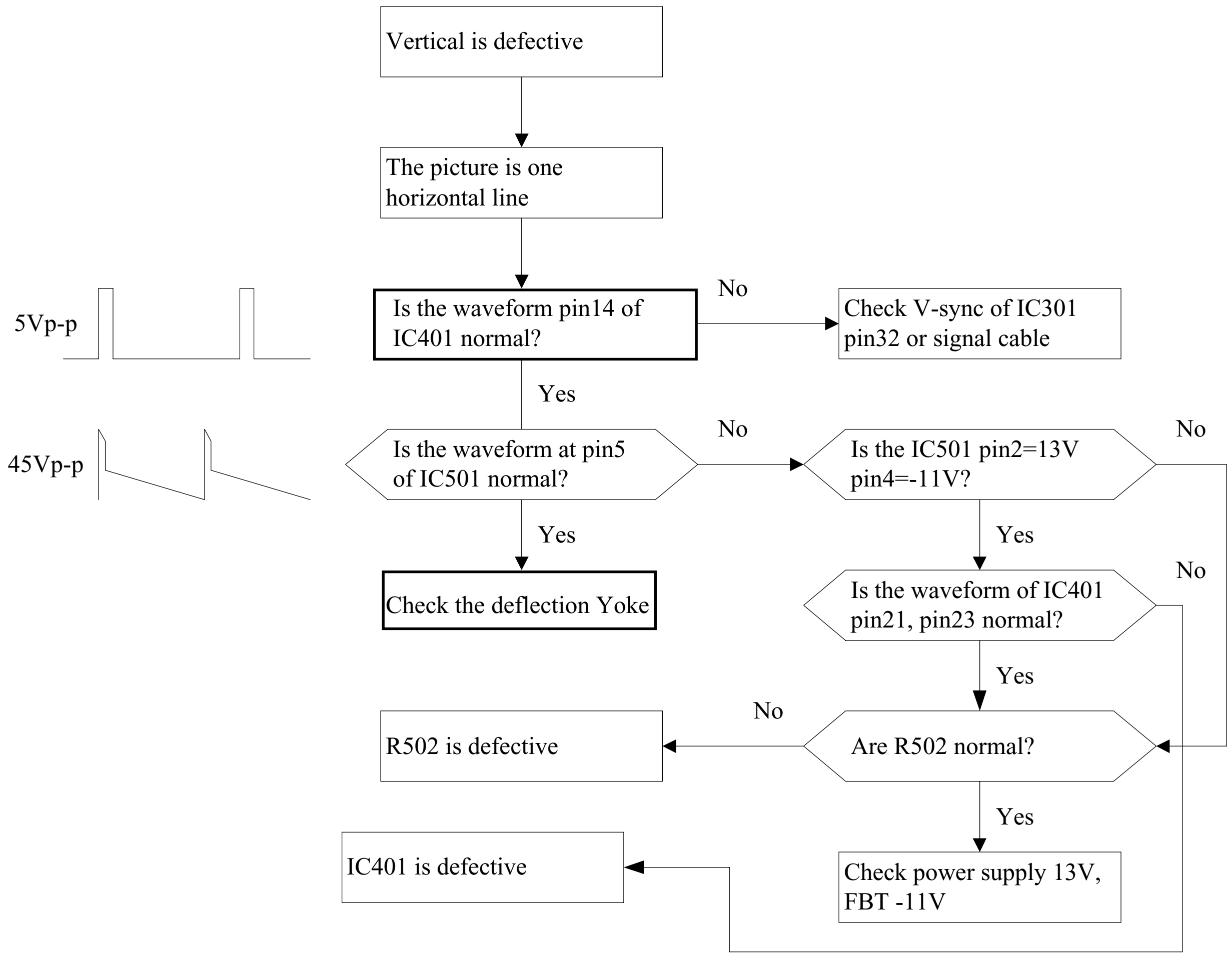
2. Horizontal deflection circuit is defective.



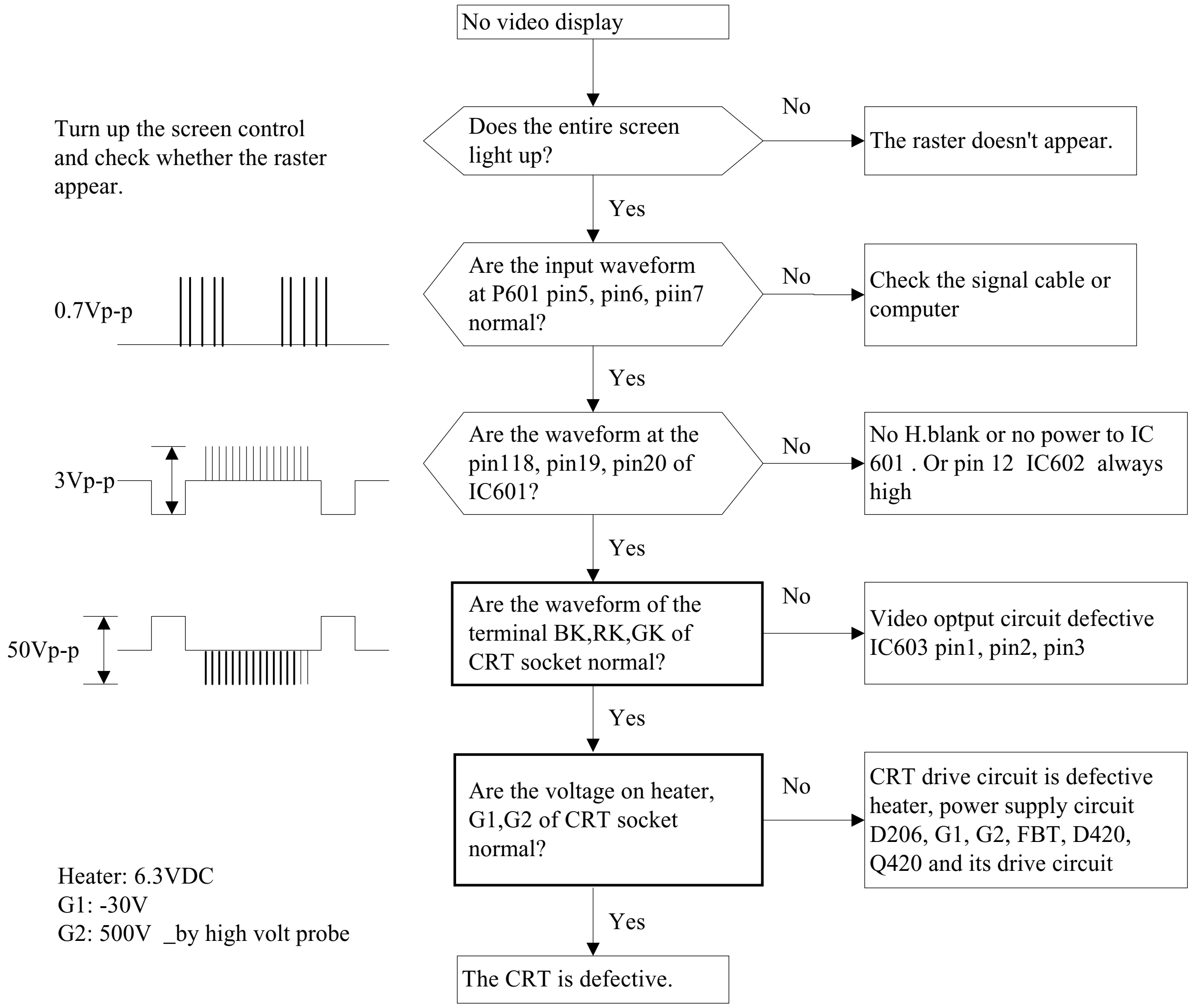
3. The raster don't appear.



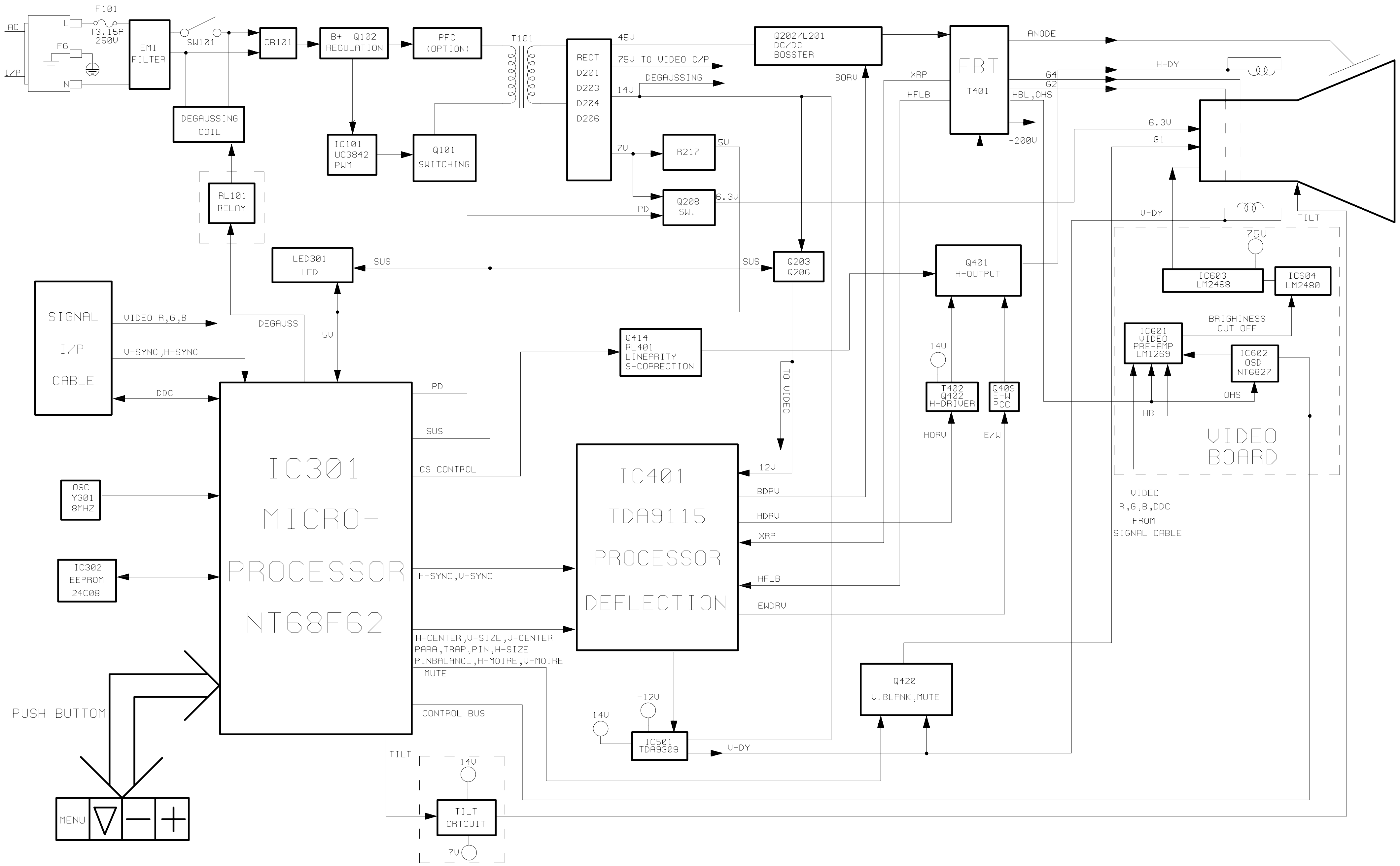
4. Vertical deflection is defective.



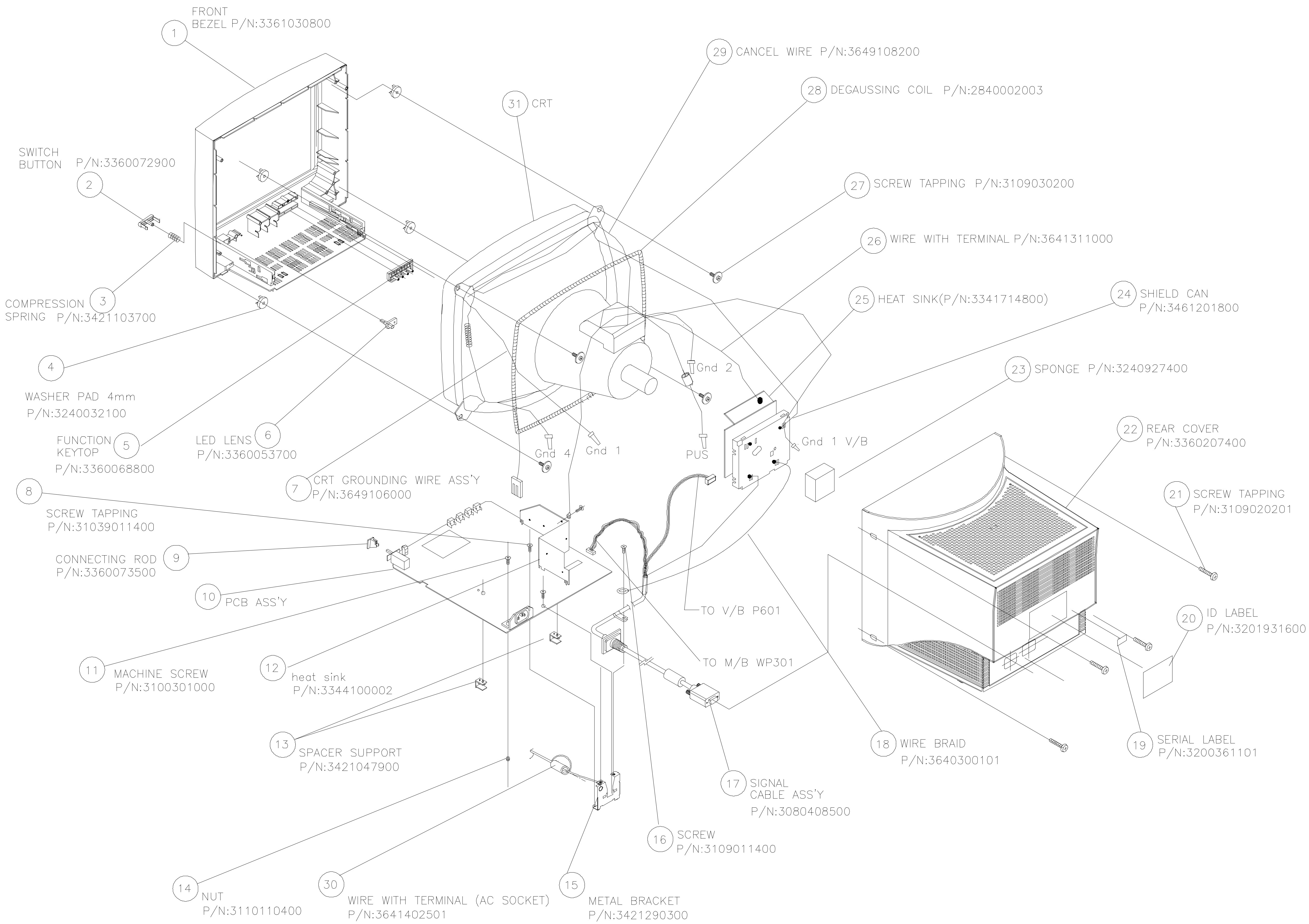
5. Video is defective.



8. BLOCK DIAGRAMS



9. EXPLODED DIAGRAM AND SPARE PARTS LIST



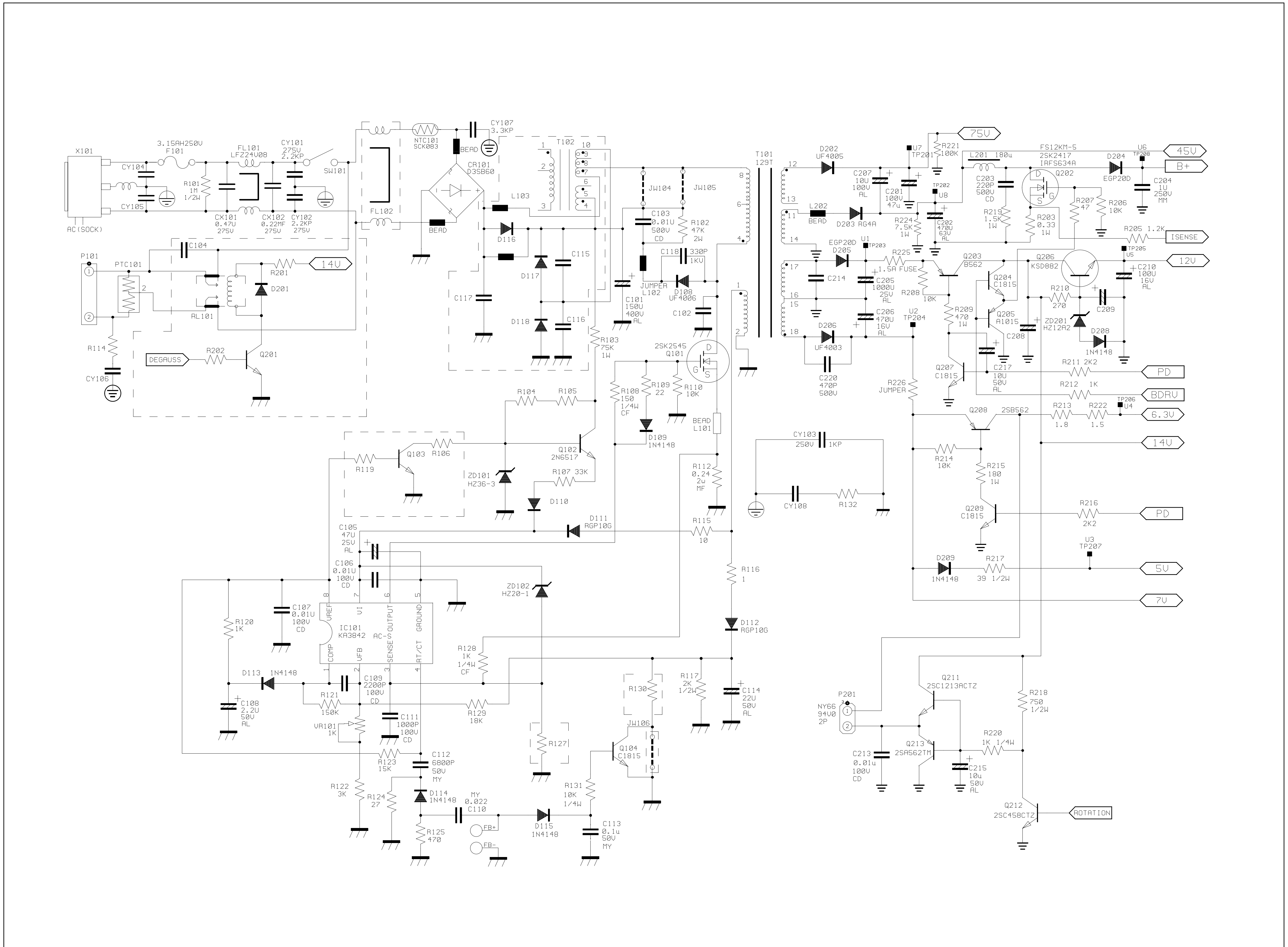
MECHANICAL PARTS LIST (E55-2)			
ITEM	DESCRIPTION	VIEWSONIC P/N	PART NO.
1	FRONT BEZEL	C-FP-0301-0882	3361030800
2	POWER KNOB	PL-BT-0706-0055	3360072900
3	COMPRESSION SPRING	M-MS-0808-1681	3421103700
4	RUBBER PAD	PL-PD-0714-0016	3240032100
5	FUNCTION KEY	PL-FK-0709-0006	3360068800
6	LED LENS	M-MS-0808-0904	3360053700
7	CRT GROUNDING WIRE		3649106000
8	SCREW TAPPING 3*0.5*6	M-SCW-0824-0413	3109011400
9	CONNECTING ROD	M-MS-0808-2793	3360073500
10	PCB ASSY	B-MB-0201-0681	5600010462
11	SCREW MACHINE M3*0.5*10	M-SCW-0824-0004	3100301000
12	HEAT SINK (HS501)		3344100002
13	SPACER SUPPORT		3421047900
14	NUT M3*0.5	M-MS-0808-7326	3110110400
15	METAL BRACKET	M-MS-0808-5728	3421290300
16	SCREW TAPPING 3*0.5*6	M-SCW-0824-0413	3109011400
17	SIGNAL CABLE	A-VC-0101-0242	3080408500
18	WIRE BRAID	M-WR-0828-0374	3640300101
19	SERIAL LABEL	M-LB-0813-0357	3200361101
20	ID LABEL		3201931600
21	SCREW TAPPING 4*18*16	M-SCW-0824-0006	3109020201
22	REAR COVER	C-BC-0302-0305	3360207400
23	SPONGE	M-MS-0808-5954	3240927400
24	SHIELD CAN	M-MS-0808-7318	3461201800
25	HEAT SINK (HS601)	M-MS-0808-7327	3341714800
26	WIRE WITH TERMINAL		3641311000
27	SCREW TAPPING 5*16*27		3109030200
28	DEGAUSSING COIL	E-L-0407-0114	2840002003
29	CANCEL WIRE		3649108200
30	WIRE WITH TERMINAL (AC SOCKET)	M-WR-0828-0412	3641402501

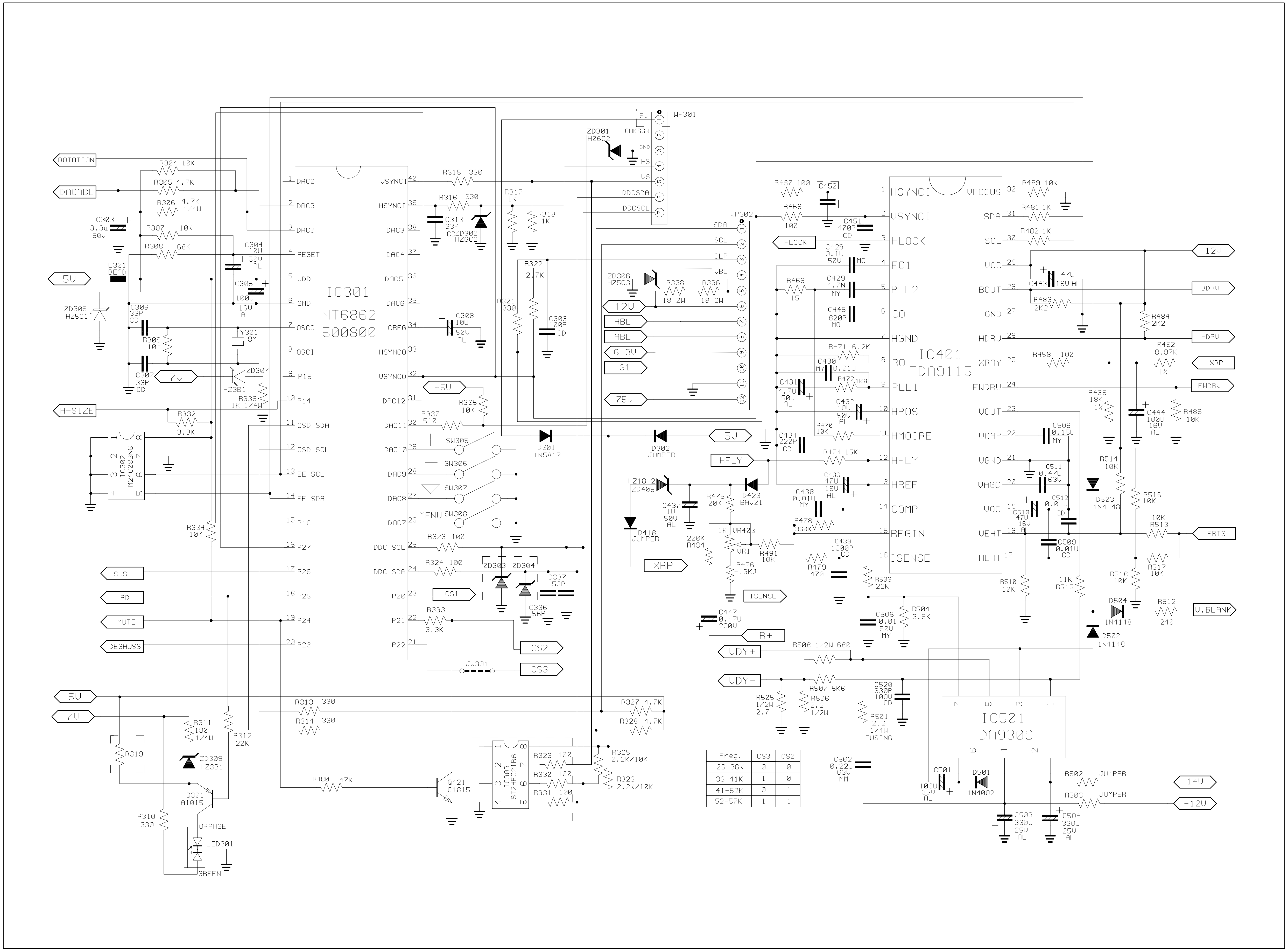
10. SPARE PARTS LIST

LOC.	VIEWSONIC P/N	PART NO.	REFERENCE NO.	DESCRIPTION
R457	E-R-0405-0935	0190201100		RES FUSING MF 1/2W 2.2 J
F101	E-FS-0410-0070	0805340602		FUSE TSC 3.15A UL SEM PIG
R225	E-FS-0410-0085	0841110202		FUSE F/P 1.5A 125V UL CSA
CR101	E-D-0403-1938	200111610123	G3SBA60	DIO BRD 600V 4GBU
D425	E-D-0403-2056	20130057223	RGP10D PKG23	DIO FRD 1A 200V DO-204
D420	E-D-0403-0611	201300590323	RGP10G PKG23	DIO FRD 1A 400V DO-41
D409	E-D-0403-2057	201300610323	RGP10J PKG23	DIO FRD 1A 600V DO-204
D404	E-D-0403-2026	201300550223	UF4002 PKG23	DIO FRD 1A 100V DO-41
D206	E-D-0403-0913	201300570523	UF4003 PKG23	DIO FRD 1A 200V DO-41
D202	E-D-0403-0919	201300610423	UF4005 PKG23	DIO FRD 1A 600V DO-41
D108	E-D-0403-1981	201300620023	UF4006 PKG23	DIO FRD 1A 800V DO-41
D406	E-D-0403-0916	201311050023	EGP20B PKG4	DIO FRD 2A 100V DO-204
D205	E-D-0403-2029	201311070023	EGP20D PKG4	DIO FRD 2A 200V DO-204
D401	E-D-0403-2055	201033670008	DTV1500MFP	DIO FRD 15A 1500V TO-220FPAC1
ZD201	E-D-0403-1936	203322610611	HZ12A2 TA	DIO ZEN .5W 11.9-12.4V DO-35
ZD405	E-D-0403-1534	203322670311	HZ18-2 TA	DIO ZEN .5W 17.5-18.3V DO-35
ZD101	E-D-0403-0923	203322850011	HZ36-3 TA	DIO ZEN .5W 36.4-38.0V DO-35
ZD305	E-D-0403-1536	203322540311	HZ5C1 TA	DIO ZEN .5W 4.9-5.1V DO-35
ZD306	E-D-0403-2058	203322540711	HZ5C3 TA	DIO ZEN .5W 5.1-5.3V DO-35
ZD102	E-D-0403-1692	203322690011	HZ20-1 TA	DIO ZEN .5W 18.8-19.7V DO-35
Diode	E-D-0403-0531	204320750017	1N4148TA	DIO SW 0.2A 75V DO-35
Diode	E-D-0403-1937	204322000207	BAV21	DIO SW 0.25A 200V SOD-27
D402	E-D-0403-0755	205350610237	RG4A-LFL1	DIO SI 1A 600V KI20
Q409	E-Q-0402-0576	210004050008	TIP122	TR 100V 5A TO-220 1000 NPN*2
Q401	E-Q-0402-1211	210058100117	KSC5802TBTU	TR 800V 10A TO-3PF 15-40
Q104	E-Q-0402-1483	210102500217	KSC1815GRTA	TR 50V 0.15A TO-92 200-400
Q102	E-Q-0402-1453	210106300017	2N6517TA	TR 350V 0.5A TO-92 30-200
Q402	E-Q-0402-1206	210233510011	2SD667CTZ	TR 80V 1A TO-92MOD 100-200
Q412	E-Q-0402-1479	211101500106	2SA562TM-Y(TPE2)	TR -30V -0.5A TO-92 120-240
Q205	E-Q-0402-1455	211102500117	KSA1015GRTA	TR -50V -0.15A TO-92 200-240
Q420	E-Q-0402-1208	211105700006	BF423(TPE2)	TR -250V -0.05A 2-5F1B 50
Q208	E-Q-0402-0504	211231010011	2SB562CTZ	TR -20V -1A TO-92MOD 120-240
Q414	E-Q-0402-1212	242016100008	IRF630MFP	FET 200V 5A 0.4ohm TO-220F
Q202	E-Q-0402-1432	242016350517	IRFS634A	FET 250V 8.1A 0.45ohm TO-220F
Q101	E-Q-0402-0156	242017400006	2SK2545	FET 600V 6A 1.25ohm TO-220F
IC603	E-IC-0401-2391	2500113311	LM2469	IC MONO TRIPLE 14nS CRT DRIVER
IC604	E-IC-0401-2392	2500165011	LM2480	IC 80V TRIPLE BIAS CLAMP 8PIN
IC101	E-IC-0401-0277	2510004210	UC384BN	IC PWM 8PIN
IC401	E-IC-0401-2444	2530095306	TDA9115	IC DEFLECTION PROCESSOR DIP-32
IC501	E-IC-0401-1142	2530111006	TDA9309	IC VERT DEFLECTION 7PIN
IC601	E-IC-0401-2393	2530159004	LM1269	IC RGB VIDEO PRE-AMP 24PIN
T403	E-T-0408-0053	2802907600	DT-E19-28	X'FMR 220mH
IC302		2610185342	M24C08BN6	IC EEPROM 8K 8PIN
IC602	E-IC-0401-2167	2610443118	NT6827-00024	IC MASK BUS CONTROLLED OSD 16I
IC301	E-IC-0401-2524	2640653801	NT6862-50080	IC 2610419718+MJ55SAM2.HEXASSY
T402	E-T-0408-0323	2800421400	19A-9008	X'FMR EE19 19mH K
T101	E-T-0408-0450	2808400000	SMT-29EV-129T	X'FMR SMT 300UH J
L201	E-L-0407-1555	2816324510	E-6112B	CHOCK CD 120uH K
T401	E-FBT-0406-0260	2850009510	CF1485DE2700A(E)	FBT 15" 70KHz 1.2mH
	A-PC-0106-0132	3090107700		AC POWER CORD L=1800 Y0-487 UL/

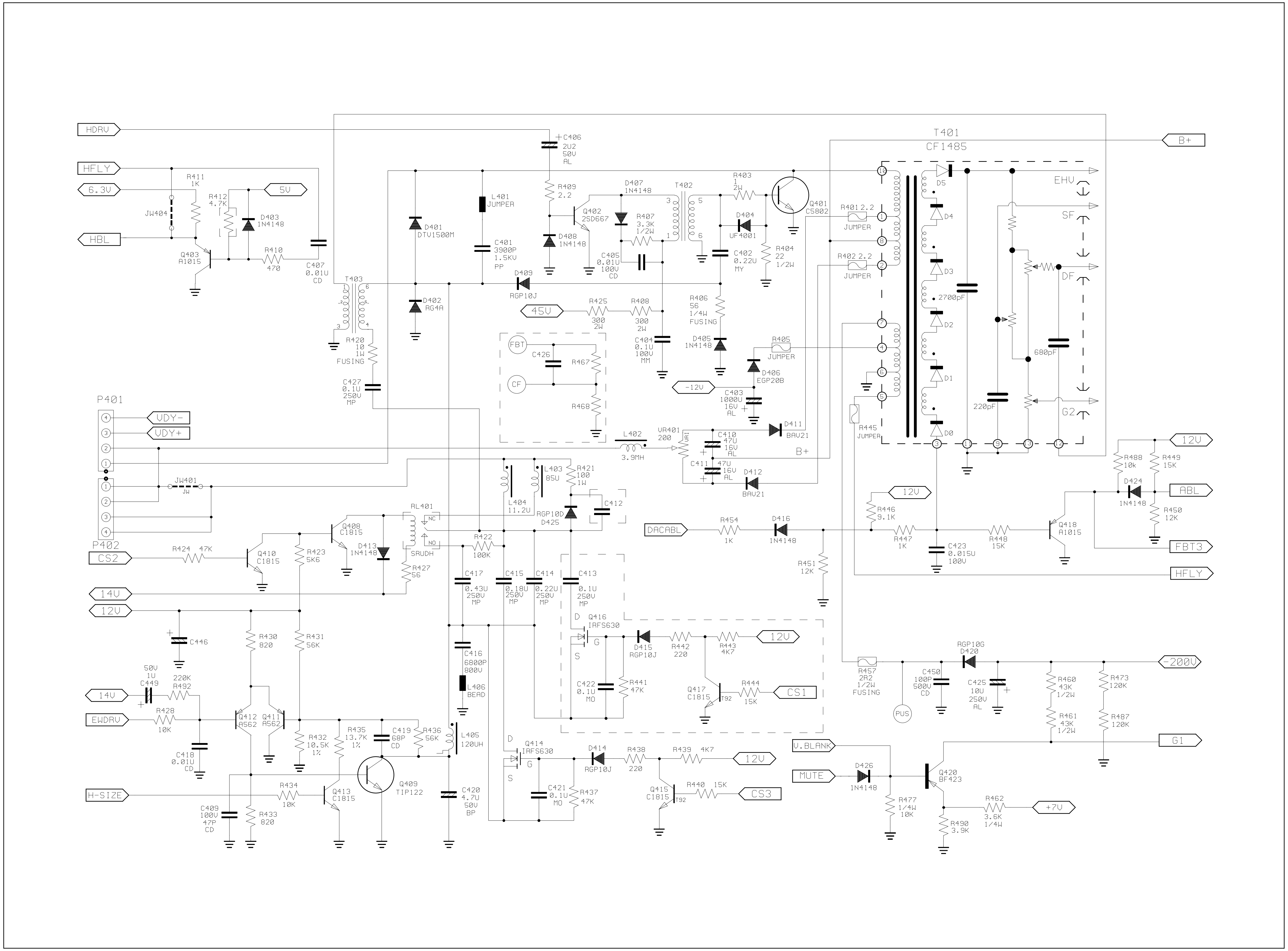
LOC.	VIEWSONIC P/N	PART NO.	REFERENCE NO.	DESCRIPTION
	C-BS-0303-0052	3368030800		SWIVEL BASE ASSY
	C-BC-0302-0305	3360207400		REAR COVER ABS Y0-487 S5RB1-3LS
	C-FP-0301-0882	3361030800,33300		FRONT BEZEL ABS Y0-487 E55 S5FB
	M-MS-0808-0904	3360053700		LED LENS
	PL-FK-0709-0006	3360068800		FUNCTION KEY ABS 94V0 #Y0487
	PL-BT-0706-0055	3360072900		POWER KNOB ABS Y0-487 S5FB1-1A
	M-MS-0808-1681	3421103700		SPRING COMPRESSION SUS-304 ID=
	M-MS-0808-4206	3421047903		SPACER SUPPORT NYLON 94V-2 14*
	P-FM-0602-0166	3500036900		END BLOCK-LEFT
	P-FM-0602-0167	3500037000		END BLOCK-RIGHT
	P-BX-0601-0701	3512225800		CARTON 481*446*453 J570SAM E55-2
	A-CD-E55-2	3532043600		CD WIZARD FOR E55-2
	M-MS-0808-8227	5011079700		QSG FOR E55-2
	M-MS-0808-2802	3520085701		PE BAG
	B-MB-0201-0681	5600010462		MAIN BOARD ASSY J570 SAM 00A

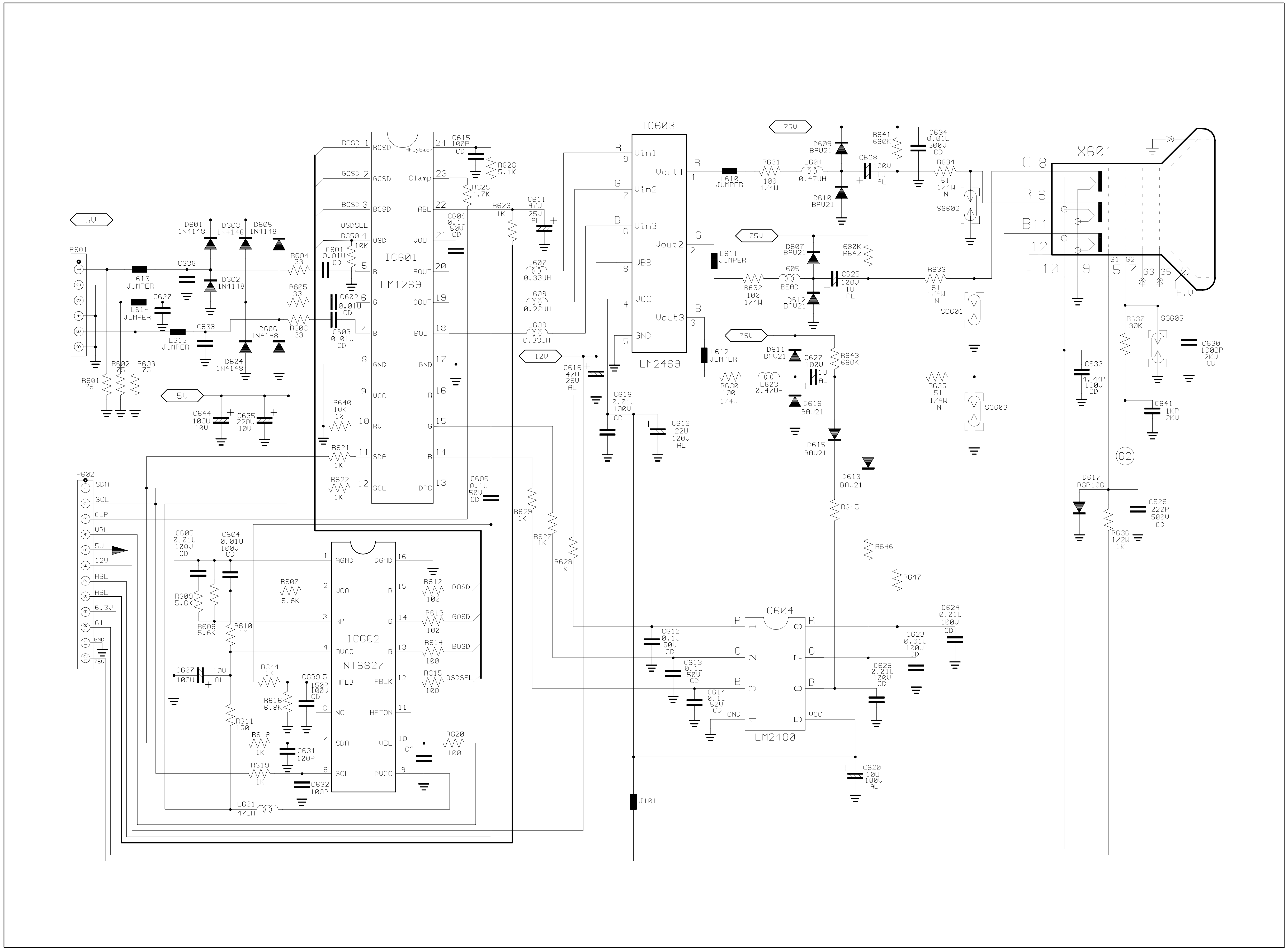
11. SCHEMATIC DIAGRAMS





Freq.	CS3	CS2
26-36K	0	0
36-41K	1	0
41-52K	0	1
52-57K	1	1


T401
CF1485
HDRV
HFLY
6.3V
5V
HBL
B+
EHV
SF
DF
G2
45V
-12V
P401
VDY-
VDY+
P402
CS2
14V
12V
EWDRV
H-SIZE
DACABL
ABL
FBT3
-200V
CS1
CS3
V.BLANK
MUTE
G1
+7V



12. PCB LAYOUT DIAGRAM

